#3

SEQUENCE LISTING

<110> Allen, Keith D.
Phillips, Russell

<120> TRANSGENIC MICE CONTAINING cGMP PHOSPHODIESTERASE GENE DISRUPTIONS

<130> R-849

<140> US 09/815,825
<141> 2001-03-22

<150> US 60/191,142
<151> 2000-03-22

<150> US 60/204,227
<151> 2000-05-15

<150> US 60/216,765
<151> 2000-07-06

<150> US 60/219,182
<151> 2000-07-19

<160> 21

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 4768
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 1
gttaactacg tcaggtggca cttttcgggg aaatgtgcgc ggaacccta tttgtttatt 60
tttctaaata cattcaaata tgtatccgct catgagacaa taaccctgat aaatgcttca 120
ataatattga aaaaggaaga gtatgagtat tcaacatttc cgtgtcgccc ttattccctt 180
ttttgcggca ttttgccttc ctgtttttgc tcacccagaa acgctggtga aagtaaaaga 240
tgctgaagat cagttgggtg cacgagtggg ttacatcgaa ctggatctca acagcggtaa 300
gatccttgag agttttcgcc ccgaagaacg ttctccaatg atgagcactt ttaaagttct 360
gctatgtggc gcggtattat cccgtgttga cgccgggcaa gagcaactcg gtcgccgcat 420
acactattct cagaatgact tggttgagta ctcaccagtc acagaaaagc atcttacgga 480
tggcatgaca gtaagagaat tatgcagtgc tgccataacc atgagtgata acactgcggc 540
caacttactt ctgacaacga tcggaggacc gaaggagcta accgcttttt tgcacaacat 600
gggggatcat gtaactcgcc ttgatcgttg ggaaccggag ctgaatgaag ccataccaaa 660
cgacgagcgt gacaccacga tgcctgtagc aatggcaaca acgttgcgca aactattaac 720
tggcgaacta cttactctag cttcccggca acaattaata gactggatgg aggcggataa 780
agttgcagga ccacttctgc gctcggccct tccggctggc tggtttattg ctgataaatc 840
tggagccggt gagcgtgggt ctcgcggtat cattgcagca ctggggccag atggtaagcc 900
ctcccgtatc gtagttatct acacgacggg gagtcaggca actatggatg aacgaaatag 960
acagatcgct gagataggtg cctcactgat taagcattgg taactgtcag accaagttta 1020
ctcatatata ctttagattg atttaccccg gttgataatc agaaaagccc caaaaacagg 1080
aagattgtat aagcaaatat ttaaattgta aacgttaata ttttgttaaa attcgcgtta 1140
aatttttgtt aaatcagctc atttttaac caataggccg aaatcggcaa aatcccttat 1200
aaatcaaaag aatagcccga gatagggttg agtgttgttc cagtttggaa caagagtcca 1260

ctattaaaga acgtggactc caacgtcaaa gggcgaaaaa ccgtctatca gggcgatggc 1320
ccactacgtg aaccatcacc caaatcaagt tttttggggt cgaggtgccg taaagcacta 1380
aatcggaacc ctaaagggag cccccgattt agagcttgac ggggaaagcg aacgtggcga 1440
gaaaggaagg gaagaaagcg aaaggagcgg gcgctagggc gctggcaagt gtagcggtca 1500
cgctgcgcgt aaccaccaca cccgccgcgc ttaatgcgcc gctacagggc gcgtaaaagg 1560
atctaggtga agatcctttt tgataatctc atgaccaaaa tcccttaacg tgagttttcg 1620
ttccactgag cgtcagaccc cgtagaaaag atcaaaggat cttcttgaga tcctttttt 1680
ctgcgcgtaa tctgctgctt gcaaacaaaa aaaccaccgc taccagcggt ggtttgtttg 1740
ccggatcaag agctaccaac tctttttccg aaggtaactg gcttcagcag agcgcagata 1800
ccaaatactg ttcttctagt gtagccgtag ttaggccacc acttcaagaa ctctgtagca 1860
ccgcctacat acctcgctct gctaatcctg ttaccagtgg ctgctgccag tggcgataag 1920
tcgtgtctta ccgggttgga ctcaagacga tagttaccgg ataaggcgca gcggtcgggc 1980
tgaacggggg gttcgtgcac acagcccagc ttggagcgaa cgacctacac cgaactgaga 2040
tacctacagc gtgagctatg agaaagcgcc acgcttcccg aagggagaaa ggcggacagg 2100
tatccggtaa gcggcagggt cggaacagga gagcgcacga gggagcttcc agggggaaac 2160
gcctggtatc tttatagtcc tgtcgggttt cgccacctct gacttgagcg tcgatttttg 2220
tgatgctcgt caggggggcg gagcctatgg aaaaacgcca gcaacgcggc ctttttacgg 2280
ttcctggcct tttgctggcc ttttgctcac atgtaatgtg agttagctca ctcattaggc 2340
accccaggct ttacacttta tgcttccggc tcgtatgttg tgtggaattg tgagcggata 2400
acaatttcac acaggaaaca gctatgacca tgattacgcc aagctacgta atacgactca 2460
ctaggcggcc gcgtttaaac aatgtgctcc tctttggctt gcttccgcgg gccaagccag 2520
acaagaacca gttgacgtca agcttcccgg gacgcgtgct agcggcgcgc cgaattcctg 2580
caggattcga gggcccctgc aggtcaattc taccgggtag gggaggcgct tttcccaagg 2640
cagtctggag catgcgcttt agcagccccg ctggcacttg gcgctacaca agtggcctct 2700
ggcctcgcac acattccaca tccaccggta gcgccaaccg gctccgttct ttggtggccc 2760
cttcgcgcca ccttctactc ctcccctagt caggaagttc ccccccgccc cgcagctcgc 2820
gtcgtgcagg acgtgacaaa tggaagtagc acgtctcact agtctcgtgc agatggacag 2880
caccgctgag caatggaagc gggtaggcct ttggggcagc ggccaatagc agctttgctc 2940
cttcgctttc tgggctcaga ggctgggaag gggtgggtcc gggggcgggc tcaggggcgg 3000
gctcaggggc ggggcgggcg cgaaggtcct cccgaggccc ggcattctcg cacgcttcaa 3060
aagcgcacgt ctgccgcgct gttctcctct tcctcatctc cgggcctttc gacctgcagc 3120
caatatggga tcggccattg aacaagatgg attgcacgca ggttctccgg ccgcttgggt 3180
ggagaggcta ttcggctatg actgggcaca acagacaatc ggctgctctg atgccgccgt 3240
gttccggctg tcagcgcagg ggcgcccggt tctttttgtc aagaccgacc tgtccggtgc 3300
cctgaatgaa ctgcaggacg aggcagcgcg gctatcgtgg ctggccacga cgggcgttcc 3360
ttgcgcagct gtgctcgacg ttgtcactga agcgggaagg gactggctgc tattgggcga 3420
agtgccgggg caggatctcc tgtcatctca ccttgctcct gccgagaaag tatccatcat 3480
ggctgatgca atgcggcggc tgcatacgct tgatccggct acctgcccat tcgaccacca 3540
agcgaaacat cgcatcgagc gagcacgtac tcggatggaa gccggtcttg tcgatcagga 3600
tgatctggac gaagagcatc aggggctcgc gccagccgaa ctgttcgcca ggctcaaggc 3660
gcgcatgccc gacggcgatg atctcgtcgt gacccatggc gatgcctgct tgccgaatat 3720
catggtggaa aatggccgct tttctggatt catcgactgt ggccggctgg gtgtggcgga 3780
ccgctatcag gacatagcgt tggctacccg tgatattgct gaagagcttg gcggcgaatg 3840
ggctgaccgc ttcctcgtgc tttacggtat cgccgctccc gattcgcagc gcatcgcctt 3900
ctatcgcctt cttgacgagt tcttctgagg ggatcgatcc gtcctgtaag tctgcagaaa 3960
ttgatgatct attaaacaat aaagatgtcc actaaaatgg aagttttcc tgtcatactt 4020
tgttaagaag ggtgagaaca gagtacctac attttgaatg gaaggattgg agctacgggg 4080
gtgggggtgg ggtgggatta gataaatgcc tgctctttac tgaaggctct ttactattgc 4140
tttatgataa tgtttcatag ttggatatca taatttaaac aagcaaaacc aaattaaggg 4200
ccagctcatt cctcccactc atgatctata gatctataga tctctcgtgg gatcattgtt 4260
tttctcttga ttcccacttt gtggttctaa gtactgtggt ttccaaatgt gtcagtttca 4320
tagcctgaag aacgagatca gcagcctctg ttccacatac acttcattct cagtattgtt 4380
ttgccaagtt ctaattccat cagaagctga ctctagatct ggatccggcc agctaggccg 4440
tcgacctcga gtgatcaggt accaaggtcc tcgctctgtg tccgttgagc tcgacgacac 4500
aggacacgca aattaattaa ggccggcccg taccctctag tcaaggcctt aagtgagtcg 4560
tattacggac tggccgtcgt tttacaacgt cgtgactggg aaaaccctgg cgttacccaa 4620
cttaatcgcc ttgcagcaca tccccctttc gccagctggc gtaatagcga agaggcccgc 4680
accgatcgcc cttcccaaca gttgcgcagc ctgaatggcg aatggcgctt cgcttggtaa 4740
taaagcccgc ttcggcgggc tttttttt 4768

<210> 2

<211> 6355
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 2
gtttaatagt aatcaattac ggggtcatta gttcatagcc catatatgga gttccgcgtt 60
acataactta cggtaaatgg cccgcctggc tgaccgccca acgacccccg cccattgacg 120
tcaataatga cgtatgttcc catagtaacg ccaataggga ctttccaatg acgtcaatgg 180
gtggagtatt tacggtaaac tgcccacttg gcagtacatc aagtgtatca tatgccaagt 240
acgcccccta ttgacgtcaa tgacggaaaa tggcccgcct ggcattaagc ccagtacatg 300
accttatggg actttcctac ttggcagtac atctacgtat tagtcatcgc tattaccatg 360
gtgatgcggt tttggcagta catcaatggg cgtggatagc ggtttgactc acggggattt 420
ccaagtctcc accccattga cgtcaatggg agtttgtttt ggcaccaaaa tcaacgggac 480
tttccaaaat gtcgtaacaa ctccgcccca ttgacgcaaa tgggcggtag gcgtgtacgg 540
tgggaggtct atataagcag agctggttta gtgaaccgtc agatccgcta gcgctaccgg 600
tcgccaccat ggtgagcaag ggcgaggagc tgttcaccgg ggtggtgccc atcctggtcg 660
agctggacgg cgacgtaaac ggccacaagt tcagcgtgtc cggcgagggc gagggcgatg 720
ccacctacgg caagctgacc ctgaagttca tctgcaccac cggcaagctg cccgtgccct 780
ggcccaccct cgtgaccacc ctgacctacg gcgtgcagtg cttcagccgc taccccgacc 840
acatgaagca gcacgacttc ttcaagtccg ccatgcccga aggctacgtc caggagcgca 900
ccatcttctt caaggacgac ggcaactaca agacccgcgc cgaggtgaag ttcgagggcg 960
acaccctggt gaaccgcatc gagctgaagg gcatcgactt caaggaggac ggcaacatcc 1020
tggggcacaa gctggagtac aactacaaca gccacaacgt ctatatcatg gccgacaagc 1080
agaagaacgg catcaaggtg aacttcaaga tccgccacaa catcgaggac ggcagcgtgc 1140
agctcgccga ccactaccag cagaacaccc ccatcggcga cggccccgtg ctgctgcccg 1200
acaaccacta cctgaggacc cagtccgccc tgagcaaaga ccccaacgag aagcgcgatc 1260
acatggtcct gctggagttc gtgaccgccg ccgggatcac tctcggcatg gacgagctgt 1320
acaagtccgg actcagatcc accggatcta gataactgat cataatcagc cataccacat 1380
ttgtagaggt tttacttgct ttaaaaaacc tcccacacct ccccctgaac ctgaaacata 1440
aaatgaatgc aattgttgtt gttaacttgt ttattgcagc ttataatggt tacaaataaa 1500
gcaatagcat cacaaatttc acaaataaag catttttttc actgcattct agttgtggtt 1560
tgtccaaact catcaatgta tcttaacgcg aactacgtca ggtggcactt ttcggggaaa 1620
tgtgcgcgga acccctattt gtttatttttt ctaaatacat tcaaatatgt atccgctcat 1680
gagacaataa ccctgataaa tgcttcaata atattgaaaa aggaagagta tgagtattca 1740
acatttccgt gtcgccctta ttccctttttt tgcggcattt tgccttcctg tttttgctca 1800
cccagaaacg ctggtgaaag taaaagatgc tgaagatcag ttgggtgcac gagtgggtta 1860
catcgaactg gatctcaaca gcggtaagat ccttgagagt tttcgccccg aagaacgttc 1920
tccaatgatg agcacttta aagttctgct atgtggcgcg gtattatccc gtgttgacgc 1980
cgggcaagag caactcggtc gccgcataca ctattctcag aatgacttgg ttgagtactc 2040
accagtcaca gaaaagcatc ttacggatgg catgacagta agagaattat gcagtgctgc 2100
cataaccatg agtgataaca ctgcggccaa cttacttctg acaacgatcg gaggaccgaa 2160
ggagctaacc gcttttttgc acaacatggg ggatcatgta actcgccttg atcgttggga 2220
accggagctg aatgaagcca taccaaacga cgagcgtgac accacgatgc ctgtagcaat 2280
ggcaacaacg ttgcgcaaac tattaactgg cgaactactt actctagctt cccggcaaca 2340
attaatagac tggatggagg cggataaagt tgcaggacca cttctgcgct cggcccttcc 2400
ggctggctgg tttattgctg ataaatctgg agccggtgag cgtgggtctc gcggtatcat 2460
tgcagcactg gggccagatg gtaagccctc ccgtatcgta gttatctaca cgacggggag 2520
tcaggcaact atggatgaac gaaatagaca gatcgctgag ataggtgcct cactgattaa 2580
gcattggtaa ctgtcagacc aagtttactc atatatactt tagattgatt taccccggtt 2640
gataatcaga aaagccccaa aaacaggaag attgtataag caaatattta aattgtaaac 2700
gttaataatt tgttaaaatt cgcgttaaat ttttgttaaa tcagctcatt ttttaaccaa 2760
taggccgaaa tcggcaaaat cccttataaa tcaaaagaat agcccgagat agggttgagt 2820
gttgttccag tttggaacaa gagtccacta ttaaagaacg tggactccaa cgtcaaaggg 2880
cgaaaaaccg tctatcaggg cgatggccca ctacgtgaac catcacccaa atcaagtttt 2940
ttggggtcga ggtgccgtaa agcactaaat cggaacccta aagggagccc ccgatttaga 3000
gcttgacggg gaaagcgaac gtggcgagaa aggaagggaa gaaagcgaaa ggagcgggcg 3060
ctagggcgct ggcaagtgta gcggtcacgc tgcgcgtaac caccacaccc gccgcgctta 3120
atgcgccgct acagggcgcg taaaaggatc taggtgaaga tccttttttga taatctcatg 3180

accaaaatcc cttaacgtga gttttcgttc cactgagcgt cagaccccgt agaaaagatc 3240
aaaggatctt cttgagatcc ttttttttctg cgcgtaatct ggtgcttgca aacaaaaaaa 3300
ccaccgctac cagcggtggt ttgtttgccg gatcaagagc taccaactct ttttccgaag 3360
gtaactggct tcagcagagc gcagatacca aatactgttc ttctagtgta gccgtagtta 3420
ggccaccact tcaagaactc tgtagcaccg cctacatacc tcgctctgct aatcctgtta 3480
ccagtggctg ctgccagtgg cgataagtcg tgtcttaccg ggttggactc aagacgatag 3540
ttaccggata aggcgcagcg gtcgggctga acgggggggtt cgtgcacaca gcccagcttg 3600
gagcgaacga cctacaccga actgagatac ctacagcgtg agctatgaga aagcgccacg 3660
cttcccgaag ggagaaaggc ggacaggtat ccggtaagcg gcagggtcgg aacaggagag 3720
cgcacgaggg agcttccagg gggaaacgcc tggtatcttt atagtcctgt cgggtttcgc 3780
cacctctgac ttgagcgtcg atttttgtga tgctcgtcag gggggcggag cctatggaaa 3840
aacgccagca acgcggcctt tttacggttc ctggcctttt gctggccttt tgctcacatg 3900
taatgtgagt tagctcactc attaggcacc ccaggcttta cactttatgc ttccggctcc 3960
tatgttgtgt ggaattgtga gcggataaca atttcacaca ggaaacagct atgaccatga 4020
ttacgccaag ctacgtaata cgactcacta ggcggccgcg tttaaacaat gtgctcctct 4080
ttggcttgct tccgcgggcc aagccagaca agaaccagtt gacgtcaagc ttcccgggac 4140
gcgtgctagc ggcgcgccga attcctgcag gattcgaggg cccctgcagg tcaattctac 4200
cgggtagggg aggcgctttt cccaaggcag tctggagcat gcgctttagc agccccgctg 4260
gcacttggcg ctacacaagt ggcctctggc ctcgcacaca ttccacatcc accggtagcg 4320
ccaaccggct ccgttctttg gtggcccctt cgcgccacct tctactcctc ccctagtcag 4380
gaagttcccc cccgccccgc agctcgcgtc gtgcaggacg tgacaaatgg aagtagcacg 4440
tctcactagt ctcgtgcaga tggacagcac cgctgagcaa tggaagcggg taggcctttg 4500
gggcagcggc caatagcagc tttgctcctt cgctttctgg gctcagaggc tgggaagggg 4560
tgggtccggg ggcgggctca ggggcgggct caggggcggg gcgggcgcga aggtcctccc 4620
gaggcccggc attctcgcac gcttcaaaag cgcacgtctg ccgcgctgtt ctcctcttcc 4680
tcatctccgg gcctttcgac ctgcagccaa tatgggatcg gccattgaac aagatggatt 4740
gcacgcaggt tctccggccg cttgggtgga gaggctattc ggctatgact gggcacaaca 4800
gacaatcggc tgctctgatg ccgccgtgtt ccggctgtca gcgcaggggc gcccggttct 4860
ttttgtcaag accgacctgt ccggtgccct gaatgaactg caggacgagg cagcgcggct 4920
atcgtggctg gccacgacgg gcgttccttg cgcagctgtg ctcgacgttg tcactgaagc 4980
gggaagggac tggctgctat tgggcgaagt gccggggcag gatctcctgt catctcacct 5040
tgctcctgcc gagaaagtat ccatcatggc tgatgcaatg cggcggctgc atacgcttga 5100
tccggctacc tgcccattcg accaccaagc gaaacatcgc atcgagcgag cacgtactcg 5160
gatggaagcc ggtcttgtcg atcaggatga tctggacgaa gagcatcagg ggctcgcgcc 5220
agccgaactg ttcgccaggc tcaaggcgcg catgcccgac ggcgatgatc tcgtcgtgac 5280
ccatggcgat gcctgcttgc cgaatatcat ggtggaaaat ggccgctttt ctggattcat 5340
cgactgtggc cggctgggtg tggcggaccg ctatcaggac atagcgttgg ctacccgtga 5400
tattgctgaa gagcttggcg gcgaatgggc tgaccgcttc ctcgtgcttt acggtatcgc 5460
cgctcccgat tcgcagcgca tcgccttcta tcgccttctt gacgagttct tctgagggga 5520
tcgatccgtc ctgtaagtct gcagaaattg atgatctatt aaacaataaa gatgtccact 5580
aaaatggaag tttttcctgt catactttgt taagaagggt gagaacagag tacctacatt 5640
ttgaatggaa ggattggagc tacgggggtg ggggtggggt gggattagat aaatgcctgc 5700
tctttactga aggctcttta ctattgcttt atgataatgt ttcatagttg gatatcataa 5760
tttaaacaag caaaaccaaa ttaagggcca gctcattcct cccactcatg atctatagat 5820
ctatagatct ctcgtgggat cattgttttt ctcttgattc ccactttgtg gttctaagta 5880
ctgtggtttc caaatgtgtc agtttcatag cctgaagaac gagatcagca gcctctgttc 5940
cacatacact tcattctcag tattgttttg ccaagttcta attccatcag aagctgactc 6000
tagatctgga tccggccagc taggccgtcg acctcgagtg atcaggtacc aaggtcctcg 6060
ctctgtgtcc gttgagctcg acgacacagg acacgcaaat taattaaggc cggcccgtac 6120
cctctagtca aggccttaag tgagtcgtat tacggactgg ccgtcgtttt acaacgtcgt 6180
gactgggaaa accctggcgt tacccaactt aatcgccttg cagcacatcc ccctttcgcc 6240
agctggcgta atagcgaaga ggcccgcacc gatcgccctt cccaacagtt gcgcagcctg 6300
aatggcgaat ggcgcttcgc ttggtaataa agcccgcttc ggcgggcttt ttttt 6355

<210> 3
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 3
tgtgctcctc tttggcttgc ttccaa 26

<210> 4
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 4
ttggaagcaa gccaaagagg agcaca 26

<210> 5
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 5
ctggttcttg tctggcttgg cccaa 25

<210> 6
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 6
ttgggccaag ccagacaaga accag 25

<210> 7
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 7
ggtcctcgct ctgtgtccgt tgaa 24

<210> 8
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 8
ttcaacggac acagagcgag gacc 24

<210> 9
<211> 23

<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 9
tttgcgtgtc ctgtgtcgtc gaa 23

<210> 10
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 10
ttcgacgaca caggacacgc aaa 23

<210> 11
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 11
aatgtgctcc tctttggctt gcttccgc 28

<210> 12
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 12
ggaagcaagc caaagaggag cacatt 26

<210> 13
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 13
aactggttct tgtctggctt ggcccgc 27

<210> 14
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 14
gggccaagcc agacaagaac cagtt 25

<210> 15
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 15
aaggtcctcg ctctgtgtcc gttgagct 28

<210> 16
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 16
caacggacac agagcgagga cctt 24

<210> 17
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 17
aatttgcgtg tcctgtgtcg tcgagct 27

<210> 18
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Phage vector

<400> 18
cgacgacaca ggacacgcaa att 23

<210> 19
<211> 3221
<212> DNA
<213> Mus musculus

<400> 19
gaattccaac ctcagcttga cgtggggcct attgaactca atttgcttgg aaactgccca 60
ggaaaggctg agagctgaac cccctccttg ggacagctaa agggagtctt caccatgggt 120
gaggtgacag cagaggaggt agaaaagttc ctggattcaa atattggctt tgccaaacaa 180
tactataacc ttcactaccg ggggaaggtc atctcagacc tcctcggggc caaggaggca 240
gctgtggact tcagcaacta ccacgatgtg aacagcgtag aggagagtga gatcatcttt 300
gacctcctgc gggacgttca ggagaactta caggctgaga aatgcacatt caatgtcatg 360
aagaagctct gcttcctcct gcgggctgac cgagtgagcc tgttcatgta caggacccgc 420
aacggcatcg ccgagctggc cactaggctc ttcaatgtcc acaaggatgc tgtgctagag 480

gactgcttgg tgatgcccga ctccgagatt gtcttccctc tggacatggg tgtcgtgggc 540
cacgtcgcac actccaaaaa gattgccaat gtccccaaca cagaagagga tgagcatttc 600
tgtgacttcg tggacaatct cacagaatat cagaccaaga acatcctggc ttccccccatc 660
atgaatggga aggatgtggt agccataatc atggctgtga ataaaataga tgaaccccac 720
ttcaccaaga gagatgaaga gattcttctc aagtacctca actttgtgaa cctgatcatg 780
aaggtattcc acctgagcta cctgcacaac tgtgagactc gtcgcggcca gatattgctg 840
tggtctggga gcaaggtctt tgaggagctc acggatatag agaggcagtt ccacaaggcc 900
ctgtacacgg tccgggcttt cctcaactgt gacagatact ccgtaggact cttagacatg 960
accaaacaga aggaattttt tgatgtgtgg ccagttctga tgggcgaggc tccagcttac 1020
tctggtccca ggactccaga cggaagggaa attaacttct acaaggtcat tgactacatc 1080
ctgcacggca aagaagacat caaagtcatc ccgaacccac ccgctgacca ctgggctcta 1140
gtgagtggtc tacccccttа cgtggctcaa aatggtctga tctgcaatat aatgaatgcg 1200
cctgcagagg acttttttga attccagaaa gagcctctgg atgagtctgg gtggatgatt 1260
aaaaatgtac tctccatgcc catcgtcaac aagaaggaag agatcgtcgg cgtggccaca 1320
ttttacaacc gcaaagatgg gaagcccttc gacgatatgg acgagaccct catggagtct 1380
ttgactcagt ttctgggatg gtcagtctta aaccctgaca cctacgagtc catgaacaag 1440
ctcgagaaca ggaaggatat cttccaggac atcgtgaaat atcacgtgaa gtgtgataac 1500
gaagaaatcc agaagatctt gaaaaccaga gaggtgtacg gcaaagagcc gtgggaatgc 1560
gaggaggagg agctggctga gatcctgcaa agagaacttc cagacgcgga gtcatacgaa 1620
atcaacaagt tccacttcag cgacctgcca ctcacggagc tggagctggt gaagtgcggc 1680
atccagatgt actacgagct cagagtgtgg gacaagttcc acatcccgca agaggccctg 1740
gtgcgcttca tgtattcgct aagcaaaggc taccggagaa tcacttacca caactggcgg 1800
catggcttca acgtggggca gaccatgttc tccttgctgg tgacaggaaa gctgaaacgg 1860
tacttcactg atctagaggc cttggccatg gtcactgctg ccttctgtca tgacatcgac 1920
cacagaggca cgaacaacct ctaccagatg aaatcacaga acccccctggc caagctccat 1980
gggtcctcca tcttggaaag gcatcatttg gagtttggca aaacactcct gagagatgag 2040
agcctgaata tcttccagaa cctgaatcgc cggcagcatg agcacgcgat ccacatgatg 2100
gacatcgcga tcattgccac agaccttgcc ttgtatttca agaaaaggac catgttccag 2160
aagattgtgg atcagtcaaa gacatatgag agtacccagg agtggaccca gtacatgatg 2220
ctggagcaga cacggaagga aattgtgatg gccatgatga tgaccgcctg tgatctctca 2280
gccatcacca aaccctggga ggtacagagc aaggtggctc tgctggtggc tgctgaattc 2340
tgggagcaag gtgacctgga gcgcacagtg ctgcagcaga atcccattcc catgatggac 2400
agaaacaagg cggatgagct ccccaagctt caagtcggct tcatcgactt tgtgtgcact 2460
tttgtctata aggagttctc ccgatttcat gaggagatta cacccatgct ggatgggatc 2520
actaacaacc gcaaggaatg gaaggcgctg gctgatgagt acgaagccaa gatgaaggcc 2580
ctggaggagg agaagcagaa gcagcaggca gccaagcaag ctgcttccgg gaaccagcca 2640
ggagggaacc cactccaggg tgcacctgca tctaagtcct gttgcatcca gtagctgact 2700
gcactgcagc agggcacagc cctcaggaag gaggaggtca ccctggcact ggacagttaa 2760
agaaccagga gcttggaagt ggtggcaaac acagcaggca tctatatcat caaatggtct 2820
tagacattgg ttctgttctg ttctgttctg ttctgttctg ttctgttctg ttctgttctg 2880
ttctgttctg ttctgtcctg tcctgttctg ttctgtttta gacagctctg gctggcctgg 2940
aactctctat gtagactggg ctggcctcaa actcacaggc ctccacctgc ctctgtgtcc 3000
tgagttctga gttaataagc aagcaccatc acacagggac ttagagattg tgtttaattc 3060
taaaaagtct atcgagtcta gcctaatatt ctagacttca tatactgact tgataatttt 3120
ttgttcttat aatgcttgta attcttataa gctttttaaa cttagtgttt tattataaaa 3180
gtgttcgcta attcccaaaa gtacagaatt atacggaatt c 3221

<210> 20
<211> 200
<212> DNA
<213> Artificial Sequence

<220>
<223> Targeting vector

<400> 20
ggaggtagaa aagttcctgg attcaaatat tggctttgcc aaacagtact ataactttca 60
ctaccggggg aaggtcatct cagacctcct cggggccaag gaggcagccg tggacttcag 120
caactaccac gatgtgaaca gcgtagagga gagtgagatc atctttgacc tcctgcggga 180
cgttcaggag aacttacagg 200

<210> 21
<211> 200
<212> DNA
<213> Artificial Sequence

<220>
<223> Targeting vector

<400> 21
tgtcgtgggc cacgtcgcac actccaaaaa gattgccaat gtccccaaca cagaagaggt 60
acgctctccc cataagatgg atgtacgaat gcactgttcc ctggggttct ggagtccaag 120
ctggctgggc tgttgctggc caccaaacct gggctagtca tagcacgata ccactctcta 180
tttataaaaa atacttagaa 200